Technical Briefing Sheet

U.S. Environmental Protection Agency, Region 10 January 2005

Fish Tissue Sampling Approach and Rationale, Upper Columbia River

During September and October 2005, field crews employed by the U.S. Environmental Protection Agency (EPA) will be collecting fish tissue samples from the Upper Columbia River site in north central Washington. This *Technical Briefing Sheet* provides information about why EPA is collecting these fish tissue samples, and presents information on the sampling approach to be used. This fish tissue sampling work is being conducted as part of an EPA-lead Remedial Investigation and Feasibility Study (RI/FS) of hazardous waste contamination in the Upper Columbia River. EPA is providing this *Technical Briefing Sheet* to help answer questions that you might have regarding the upcoming sampling.

Background

Numerous investigations and studies over the past 20 years have identified the presence of contamination within the riverine habitat between the U.S.-Canadian border and Northport and within Lake Roosevelt (the reservoir behind Grand Coulee Dam). A 2001 EPA investigation of the upper 70 miles of the Upper Columbia River and Lake Roosevelt confirmed that widespread contamination was present in lake and river sediments at levels that posed a potential threat to people and animals that might contact the sediment. These findings led EPA to recommend that additional investigation was needed to evaluate the nature and extent of the problem, assess risks to people and animals, and determine possible cleanup actions.

Studies investigating the presence of chemical contaminants in fish from the Upper Columbia River and Lake Roosevelt were first conducted in the late 1970s. These studies have consistently found, in a variety of fish species, elevated levels of various chemical contaminants (that is, metals, dioxins and furans, and polychlorinated biphenyls [PCBs]) that might pose a potential heath threat to humans. A study conducted by the U.S. Geological Survey in 1994 found that walleye fish tissue contained high mercury concentration levels. Because of this, the Washington Department of Health issued a fish consumption advisory for walleye.

This *Technical Briefing Sheet* describes the initial phase of fish tissue sampling activities that will be conducted as part of the RI/FS. The fish tissue investigation will be conducted within an approximately 150-mile reach of the Upper Columbia River, from the U.S.–Canadian border (River Mile 744) to the Grand Coulee Dam (River Mile 597).

Recent EPA actions

During the last several months, EPA has:

- Reviewed data and findings from past studies and investigations related to the presence of chemical contaminants in fish from the Upper Columbia River.
- Reviewed data and findings from past studies and investigations related to the basic condition of Lake Roosevelt (hydrology, water chemistry, primary production, and zooplankton production), the condition of the fishery (relative abundance, length-weight relationships, and predator-prey relations), and the fishery as a recreational resource (creel surveys)
- Developed a preliminary understanding of site conditions and potential contamination related to fish within the lake and river
- Identified data and information that are needed to determine if contaminant concentrations found in fish and invertebrates from the Upper Columbia River pose unacceptable risks to fish, as well as wildlife and humans that might consume them
- Identified information gaps that must be addressed to better understand the location, character, and threat related to contaminants in fish
- Developed a sampling design and approach to collect fish tissue samples from throughout the Upper Columbia River study area
- Identified specific contaminants that will be analyzed as part of the current phase of investigation
- Prepared a draft *Phase I Fish Tissue Sampling Approach and Rationale* report that describes the proposed 2005 fish tissue sampling activities,

and the technical justification to support the sampling activities described therein

Potential sources of contamination

Contaminants that might harm fish or accumulate in fish tissue have been introduced into the Upper Columbia River through a variety of point sources (specific, identifiable locations) and non-point sources (those that cannot be traced to a specific location). Documented point sources to the Upper Columbia River include:

- Permitted discharges of liquid effluent and solid-phase materials (including incidental spills) from industrial facilities
- Municipal stormwater discharges and discharges from wastewater treatment facilities
- Localized discharges of contaminated groundwater and stormwater runoff to the Upper Columbia River and/or its tributaries

Non-point sources can include airborne dispersion of contaminants as part of watershed-wide releases.

Sediments within the Upper Columbia River contain known environmental contaminants that have been derived from both point and non-point sources. Sediment and surface water are the primary media in the Upper Columbia River by which chemicals are moved from source areas to locations where fish can be exposed to them.

A major point source for metals is the Teck Cominco Metals, Ltd., industrial/metallurgical complex in Trail, British Columbia. Considerable quantities of slag (a metal-enriched metallurgical by-product) were discharged to the Upper Columbia River by the Cominco operations, and are evident in bottom sediments downstream from the facility. The primary source of historical loading of dioxins and furans to the Upper Columbia River was the Celgar Pulp Company mill in Castlegar, British Columbia. Specific PCB point sources are unknown.

Historical sampling and analyses have confirmed the presence of metals, dioxins/furans, and PCBs in tissue collected from some fish in the Upper Columbia River at concentrations that might pose a threat to fish and to the wildlife and humans that might eat the fish.

How can fish be exposed to contamination?

Contaminants that are dissolved in surface water, attached to suspended particulates, or in bed sediment might affect fish when these contaminants:

- Move across the fish's skin or gill surface
- Move across the fish's gut from water and sediment that is swallowed during feeding
- Have accumulated in plants, invertebrates, and fish that the fish eat

Fish can also act as a contaminated exposure medium to wildlife and humans.

How did EPA develop the design and approach for the Phase I fish tissue program?

EPA has developed a systematic approach (a data quality objectives process) to identify specific data needs to be addressed by a Remedial Investigation. This process was used to develop the specific types of data to be collected, as well as the approach and design of the Phase I fish tissue sampling program. EPA considered the specific data needs identified in the data quality objectives process, the unique site characteristics, and the collective input and comments received from the Colville Tribe, the Spokane Tribe, the U.S. Department of the Interior, and the Washington State Department of Ecology.

What kinds of fish tissue samples will be collected, and where?

The Phase I fish tissue sampling program has been designed to collect samples that can be used to provide data that:

- Are representative of the Upper Columbia River study area
- Represent expected exposure areas for the target fish species (that is, within their typical home range)
- Are representative of areas where recreational and Tribal anglers harvest and consume fish
- Are representative of areas where wildlife might forage for fish
- Are in areas that overlap the sediment sampling Focus Areas so they can be compared with data collected in the Phase I sediment sampling program for the Upper Columbia River
- Can be used to assess risk to fish and to wildlife and humans that consume fish

In the September/October 2005 Phase I investigation, 138 fish tissue composite samples will be collected from four target fish species (walleye, rainbow trout, lake whitefish, and largescale sucker)

at eleven locations distributed throughout the Upper Columbia River.

The rationale for selection of the four target fish species and the kinds of samples that will be collected are provided below:

- **Walleye (*Stizostedion viteum*)**. Walleye are the top-level predators. Walleye feed heavily on other fish, so it is expected that they would accumulate high levels of contaminants like mercury. Historically, their tissue has had the highest mercury concentration levels of all the fish analyzed. Because of this, the Washington Department of Health issued a fish consumption advisory. Whole body and fillet samples will be collected.
- **Rainbow trout (*Oncorhynchus mykiss*)**. Rainbow trout are the most commonly harvested fish from the Upper Columbia River. Previous studies have shown rainbow trout to have elevated levels of dioxins/furans and PCBs. Whole body and fillet samples will be collected.
- **Lake whitefish (*Coregonus clupeaformis*).** Lake whitefish are one of the most common fish found in Lake Roosevelt. They feed on both animals in the water and in the bottom sediments. Because lake whitefish can live over 15 years, they have the potential to accumulate high levels of contaminants. Previous studies have shown lake whitefish to have high levels of dioxins/furans. Whole body samples will be collected.
- **Largescale sucker (*Catostomas catosomas*)**. Largescale suckers are bottom feeders. It is expected that they have a greater exposure to sediment-related contaminants. Existing data show that the tissue of largescale suckers has elevated levels of slag-related metals. Whole body samples will be collected.

Whole body samples are proposed because some Tribal and potentially other ethnic population groups eat more than just fillets. Analysis of whole fish will provide a conservative estimate of risk for those groups. The proposed tissue samples will also be used to assess risk to the fish and to the wildlife that might consume them.

Skin-on fillets are proposed because typical recreational anglers commonly prepare fish as fillets for consumption. In addition, EPA recommends this tissue type for use when conducting fish tissue analysis for dioxins/furans and PCBs.

The sample locations are shown in Figure 1.

What kinds of contaminant data analyses are needed?

The data quality objectives process identified the types of laboratory analyses needed for the fish tissue samples. These samples will be collected and analyzed for metals, dioxins/furans, and PCBs. Since many of these contaminants are found associated with fats, the lipid or fat content of the fish will also be measured.

To learn more

EPA is providing a variety of ways for people to learn more about the Upper Columbia River RI/FS project and get involved.

- **Visit our Web site.** EPA has developed a Web site for the Upper Columbia River project. Visit: www.epa.gov/r10earth/, click on *index A-Z*, click on *U* for *Upper Columbia River*.
- **Join our mailing list.** Fact sheets regarding the project will be sent to parties on our mailing list. To be added to or removed from the list, contact Deborah Neal at 800- 424-4372 or neal.deborah@epa.gov.
- **Read project fact sheets.** EPA has prepared fact sheets to describe the project and its goals. They are sent out by regular mail and are available on the EPA Web site. We will continue to publish fact sheets as milestones are reached and there is news to report.
- **Talk with EPA project staff.** EPA project managers and community involvement coordinators are available to talk with you to discuss the investigation and answer questions. If possible, one of us will attend community or club meetings to provide updates. See contact information below.
- **Visit an information repository.** EPA has established eight information repositories for the Upper Columbia River project. These are places where you can read project documents. Be sure to call ahead for business hours.
  - *Northport*: Northport Town Hall, 315 Summit Street, 509-732-4450
  - *Colville*: Colville Public Library, 195 South Oak Street, 509-684-6620

  - *Inchelium*: Inchelium Tribal Resource Center, 12 Community Loop, 509-634-2791
  - *Grand Coulee*: Grand Coulee Library, 225 Federal Street, 509-633-0972
  - *Wellpinit*: Spokane Tribe Department of Natural Resources, 6290 B Ford-Wellpinit Road, 509-258-9042
  - *Davenport:* Davenport Library, 411 Morgan Street, 509-725-4355
  - *Spokane:* Spokane Library, 906 W. Main, 509-444-5334
  - *Nespelem:* Office of Environmental Trust, Colville Confederated Tribes, 1 Colville, 509-634-2425
- **Read articles in local papers.** EPA will share significant project news and milestones with local, Tribal, and community newspapers and newsletters via press releases, fact sheets, and briefing sheets. Some publications are already covering EPA's Upper Columbia River activities on a regular basis.

Contacts

If you have questions, concerns, or suggestions on this project, please call or email us.

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TTY users, call 800-877-8339. If you need materials in languages other than English, please call Deborah Neal.

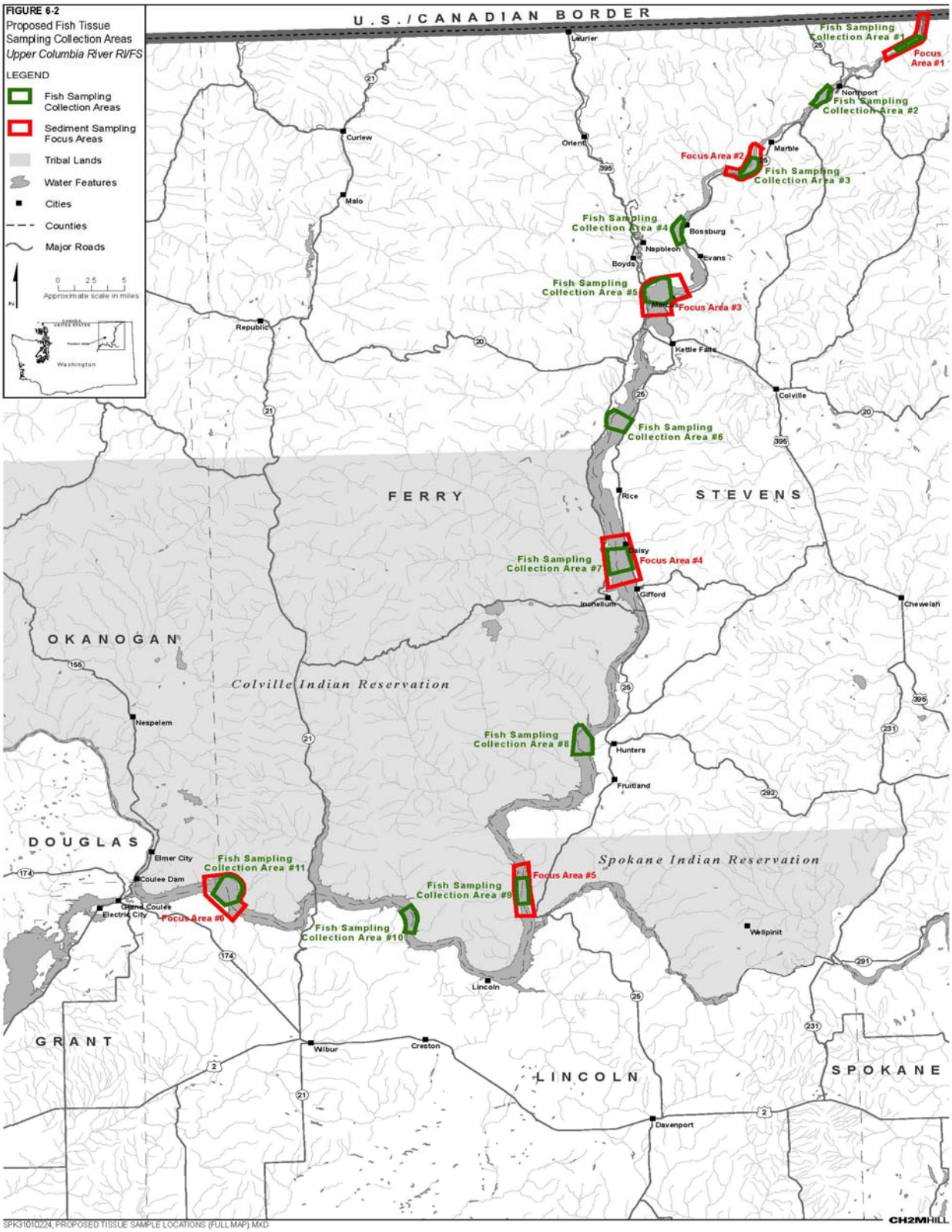
FIGURE 6-2
Proposed Fish Tissue Sampling Collection Areas
Upper Columbia River RI/FS
LEGEND
Fish Sampling Collection Areas
Sediment Sampling Focus Areas
Tribal Lands
Water Features
Cities
Counties
Major Roads
0 2.5 5
Approximate scale in miles
Washington
U.S./CANADIAN BORDER
Laurier
Fish Sampling Collection Area #1
Focus Area #1
Northport
Fish Sampling Collection Area #2
Curlew
Orient
Marble
Focus Area #2
Fish Sampling Collection Area #3
Malo
Fish Sampling Collection Area #4
Bossburg
Napoleon
Evans
Boyds
Fish Sampling Collection Area #5
Focus Area #3
Republic
Kettle Falls
Colville
Fish Sampling Collection Area #6
FERRY
STEVENS
Rice
Daisy
Focus Area #4
Fish Sampling Collection Area #7
Inchelium
Gifford
Chewelah
OKANOGAN
Colville Indian Reservation
Nespelem
Fish Sampling Collection Area #8
Hunters
Fruitland
DOUGLAS
Elmer City
Fish Sampling Collection Area #11
Coulee Dam
Spokane Indian Reservation
Focus Area #5
Fish Sampling Collection Area #9
Grand Coulee
Electric City
Focus Area #6
Fish Sampling Collection Area #10
Wellpinit
Lincoln
GRANT
Wilbur
Creston
LINCOLN
SPOKANE
Davenport
SPK31010224, PROPOSED TISSUE SAMPLE LOCATIONS (FULL MAP).MXD
CH2MHILL